



**sifam tinsley**  
PRECISION INSTRUMENTATION

Alpha 70  
MULTIFUNCTION METER  
Alpha Series  
[www.sifamtinsley.co.uk](http://www.sifamtinsley.co.uk)



Multifunction Meters

Transducers & Isolators

Temperature Controllers

Converters & Recorders

Digital Panel Meters

Current Transformers

Analogue Panel Meters

Shunts

Digital Multimeters

Clamp Meters

Insulation Testers

## ALPHA 70 MULTIFUNCTION METER (ALPHA SERIES)

User Manual - Issue 1.0

**SUBJECT TO CHANGE WITHOUT NOTICE**

This manual superseded all previous versions – please keep for future reference

### Features

- Phasor representation of all 3 phases for system analysis
- Energy class 0.5S as per standard IEC 62053-11
- True representation of voltage and current waveforms
- Real Time Clock (RTC)
- Individual harmonics up to 56th harmonics
- Time of use configurable zones, seasons, tariff profiles which helps energy analysis



**Alpha 70** is a compact, multi-function panel mount power quality monitor, which measures, calculates and displays major electrical parameters of three phase power system.

### 1. Application

Alpha 70 is a compact, multi-function panel mount power quality monitor, which measures, calculates and displays major electrical parameters of three phase power system like voltage, current, active/ fundamental reactive, apparent power and energy, individual harmonics, sags and swells.

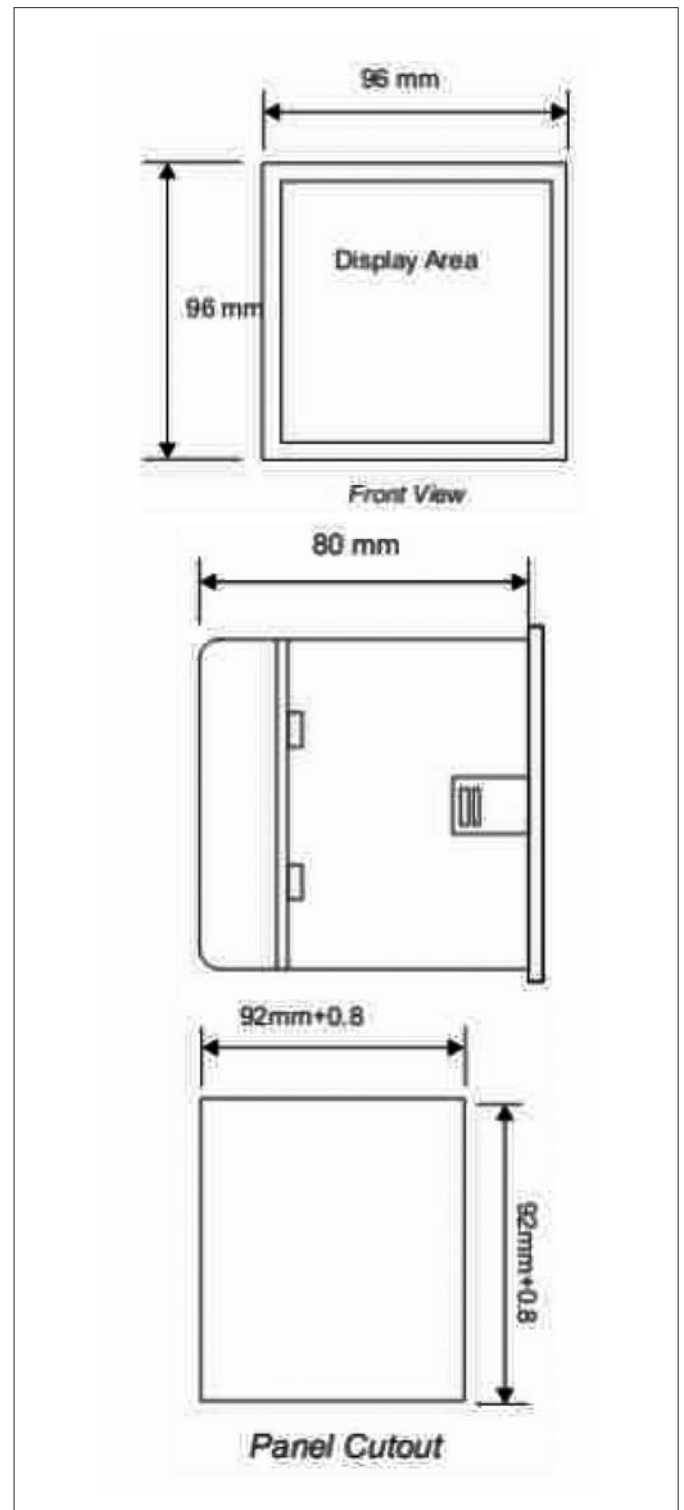
### 2. Product Features

|                                                  |                                                                                                                                                                                                                                                                                                                                                                   |                                              |                                                                                                                                                                                                                           |
|--------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Measures & Monitors more than 80 parameters      | All basic electrical parameters. Power quality parameters (Overcurrent, Sag & Swell). Individual harmonics contains of per phase voltage and current.                                                                                                                                                                                                             | Real Time Clock (RTC)                        | Displays time and date.<br>4 seasons<br>4 tariffs<br>6 time zones per day<br>4 types of days<br>5 tariff energy registers<br>Automatic daily profile storage for a one day, one month & one year Cost per kWh calculation |
| True RMS measurement                             | The instrument measures distorted waveform up to 56th Harmonic for 50Hz and up to 46th Harmonic for 60Hz.                                                                                                                                                                                                                                                         | Phase sequence detection                     | Incorrect phase sequence indication or phase failure indication on any of the input voltages.                                                                                                                             |
| Power Quality Measurement                        | Sags & Swells detection Measurable up to 56th for 50Hz and upto 46th harmonic for Maximum any 6 harmonics can be monitored simultaneously for each phase. Measurement of RMS value of fundamental and per phase voltage and current harmonics. (%) THD of per phase voltage and current Distortion factor of individual harmonics Time stamping of sags & swells. | Direct remote access                         | Remote access of measured parameters. User Assigned Registers for MODBUS. Programmable baud rates up to 38.4kbps. Remote configuration of the Instrument via MODBUS                                                       |
| Graphical Analysis                               | Per phase individual harmonic bar graph representation. Real time vector representation of all 3 Phases for complete system analysis.                                                                                                                                                                                                                             | Limit (Alarm) & Pulse Relay Output           | Potential free, very fast acting relay contact Configurable as pulse output which can be used to drive an external counter for energy measurement. Configurable as limit (alarm) switch                                   |
| Energy class 0.5S as per IEC 62053               | Independent Import and Export energy counter. Active energy (kWh), Fundamental                                                                                                                                                                                                                                                                                    | Compliance to International Safety standards | Compliance to International Safety standard IEC 61010-1- 2010                                                                                                                                                             |
| Onsite programmable for user desired application | Onsite programmable input voltage (100VLL to 500VLL), input current (1A or 5A) and system configuration (3 phase 4Wire (unbalanced) or 3 phase 3Wire (unbalanced) network). Onsite programmable CT ratio & PT ratio. Wide auxiliary power supply range: 60-300V AC/DC.                                                                                            | EMC Compatibility                            | Compliance to International standard IEC 61326.                                                                                                                                                                           |
| Time of DAY (TOD / TOU)                          | Easy programmable tariff schedule                                                                                                                                                                                                                                                                                                                                 |                                              |                                                                                                                                                                                                                           |

### 3. Technical Specifications

| <b>Accuracy</b>                             |                                                                                    |
|---------------------------------------------|------------------------------------------------------------------------------------|
| Active Energy                               | Class 0.5S as per IEC 62053-22                                                     |
| Apparent Energy                             | Class 0.5S as per IEC 62053-22                                                     |
| Fundamental Reactive Energy                 | Class 2 as per IEC 62053-23                                                        |
| Reference Conditions (As per. IEC/EN 60688) | Ambient 23°C ± 1°C<br>Sinusoidal (distortion factor 0.005), 60 Hz                  |
| Active Power                                | ±0.2% of Nominal value                                                             |
| Fundamental Reactive Power                  | ±0.2% of Nominal value                                                             |
| Apparent Power                              | ±0.2% of Nominal value                                                             |
| Power Factor/<br>Phase Angle                | ±2°                                                                                |
| Voltage                                     | ±0.2% of Nominal value                                                             |
| Current                                     | ±0.2% of Nominal value                                                             |
| Frequency                                   | ±0.1% of Nominal value                                                             |
| Harmonics                                   | ±1.0%                                                                              |
| THD Voltage/Current                         | ±1.0%                                                                              |
| <b>Input Voltage</b>                        |                                                                                    |
| Nominal input voltage (AC RMS)              | 57.7 - 288.68 VL-N On site Programmable ( Line-Line 100 - 500 VL-L)                |
| System PT primary values                    | 100VLL to 692.8 kVLL<br>On site Programmable                                       |
| Max continuous input voltage                | 347 VLN, 600 VLL                                                                   |
| Voltage Measuring Range                     | 5 VLN..... 347 VLN,<br>9 VLL..... 600 VLL.                                         |
| Overload Withstand                          | 2x times of Nominal voltage for 1 second, repeated 10 times at 10 second intervals |
| Frequency Measuring Range                   | 45Hz to 66Hz                                                                       |

### 4. Dimensions

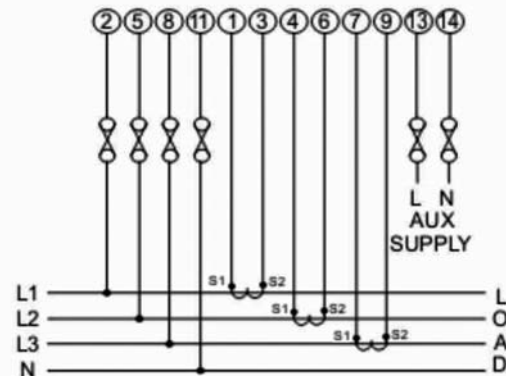


## Technical Specifications

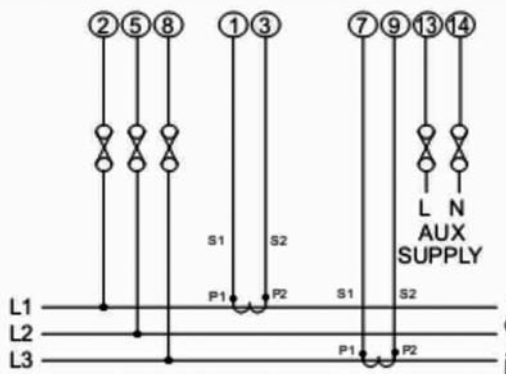
| Input Current                                              |                                                                                |
|------------------------------------------------------------|--------------------------------------------------------------------------------|
| Nominal input current                                      | 1A / 5A AC RMS<br>On site Programmable                                         |
| System CT primary values                                   | From 1A up to 9999A<br>On site Programmable                                    |
| Max continuous input current                               | 120% of Nominal value                                                          |
| Current Measuring Range                                    | 5% to 120% of Nominal current                                                  |
| Overload Withstand                                         | 20x times of Nominal current for 1 second, repeated 5 times at 5 min intervals |
| Starting Current for energy as per IEC 62053-22 class 0.5S | 1 mA for 1A range<br>5 mA for 5A range                                         |
| Auxiliary Supply                                           |                                                                                |
| External Aux                                               | 60 V – 300V AC-DC                                                              |
| Aux Supply Frequency                                       | 50/60 Hz (± 10 %)                                                              |
| Environmental Conditions                                   |                                                                                |
| Operating Temperature                                      | -20 to +70°C                                                                   |
| Storage Temperature                                        | -30 to +80°C                                                                   |
| Relative Humidity                                          | 0... 95% non condensing                                                        |
| Warm up Time                                               | Minimum 3 minute                                                               |
| Shock                                                      | 15g in 3 planes                                                                |
| Vibration                                                  | 10... 150.... 10 Hz,<br>0.075mm amplitude                                      |
| Temperature Conflict                                       | 0.05%/°C                                                                       |
| Display update rate                                        |                                                                                |
| Response Time to Step Input                                | 1 Sec. approx.                                                                 |
| Real Time Clock (RTC)                                      |                                                                                |
| Uncertainty                                                | ± 2 minutes/month (23°C<br>± 1°C) (trimmable through display or MODBUS)        |
| V A Burden                                                 |                                                                                |
| Nominal input voltage burden                               | < 0.2 VA approx. per phase                                                     |
| Nominal input Current burden                               | < 0.2 VA approx. per phase                                                     |
| Auxiliary Supply burden                                    | < 6.5 VA approx.                                                               |

## 5. Electrical Connections

### Network Types :



**a) 3 Phase 4 Wire Unbalanced Load**



**b) 3 Phase 3 Wire Unbalanced Load**

It is recommended that the wires used for connections to the instrument should have lugs soldered at the end. That is, the connections should be made with Lugged wires for secure connections.

The Maximum diameter of the lug should be 7.0mm and maximum thickness 3.5mm.

Permissible cross section of the connecting wires should be  $\leq 4.0 \text{ mm}^2$  Single wire or  $2 \times 2.5 \text{ mm}^2$  fine wire.

## Technical Specifications

| Applicable Standards  |                                                         |
|-----------------------|---------------------------------------------------------|
| EMC                   | IEC 61326                                               |
| Immunity              | IEC 61000-4-3, 10V/m min – Level 3 industrial Low level |
| Safety                | IEC 61010-1-2010, Permanently connected use             |
| IP for water and dust | (IP 54 for Front) IEC60529                              |
| Pollution degree      | 2                                                       |
| Installation Category | III                                                     |
| High Voltage Test     | 5.23 kV DC for 1 minute between all Electrical circuits |

## 6. Power Quality Parameters

|                                                                                                                                                               |                                             |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------|
| Sag Threshold*                                                                                                                                                | Adjustable..10%.... 90% of Nominal Value    |
| Swell Threshold*                                                                                                                                              | Adjustable.. 110%.... 150% of Nominal Value |
| Over Current*                                                                                                                                                 | Adjustable.. 110%.... 150% of Nominal Value |
| *Detects sag / swell / Over current if Voltage/Current waveform remains below or above threshold for at least 500msec with an interval of 500ms respectively. |                                             |

## 7. Display Parameter

| Sr No | Parameter                                            | 3 Phase 4 Wire | 3 Phase 3 Wire |
|-------|------------------------------------------------------|----------------|----------------|
| 1.    | System Voltage                                       | ✓              | ✓              |
| 2.    | System Current                                       | ✓              | ✓              |
| 3.    | Volts L1 – N                                         | ✓              | ×              |
| 4.    | Volts L2 – N                                         | ✓              | ×              |
| 5.    | Volts L3 – N                                         | ✓              | ×              |
| 6.    | Volts L1 – L2                                        | ✓              | ✓              |
| 7.    | Volts L2 – L3                                        | ✓              | ✓              |
| 8.    | Volts L3 – L1                                        | ✓              | ✓              |
| 9.    | Current L1                                           | ✓              | ✓              |
| 10.   | Current L2                                           | ✓              | ✓              |
| 11.   | Current L3                                           | ✓              | ✓              |
| 12.   | Neutral Current                                      | ✓              | ×              |
| 13.   | Frequency                                            | ✓              | ✓              |
| 14.   | System Active Power (kW)                             | ✓              | ✓              |
| 15.   | Active Power L1 (kW)                                 | ✓              | ×              |
| 16.   | Active Power L2 (kW)                                 | ✓              | ×              |
| 17.   | Active Power L3 (kW)                                 | ✓              | ×              |
| 18.   | System Fundamental Reactive Power (kVAR)             | ✓              | ✓              |
| 19.   | Fundamental Reactive Power L1 (kVAR)                 | ✓              | ×              |
| 20.   | Fundamental Reactive Power L2 (kVAR)                 | ✓              | ×              |
| 21.   | Fundamental Reactive Power L3 (kVAR)                 | ✓              | ×              |
| 22.   | System Apparent Power (kVA)                          | ✓              | ✓              |
| 23.   | Apparent Power L1 (kVA)                              | ✓              | ×              |
| 24.   | Apparent Power L2 (kVA)                              | ✓              | ×              |
| 25.   | Apparent Power L3 (kVA)                              | ✓              | ×              |
| 26.   | System Power Factor                                  | ✓              | ✓              |
| 27.   | Power Factor L1                                      | ✓              | ×              |
| 28.   | Power Factor L2                                      | ✓              | ×              |
| 29.   | Power Factor L3                                      | ✓              | ×              |
| 30.   | Phase Angle L1                                       | ✓              | ×              |
| 31.   | Phase Angle L2                                       | ✓              | ×              |
| 32.   | Phase Angle L3                                       | ✓              | ×              |
| 33.   | Import kWh (Up to 14 digit resolution)               | ✓              | ✓              |
| 34.   | Export kWh (Up to 14 digit resolution)               | ✓              | ✓              |
| 35.   | Fundamental Import kVARh (Up to 14 digit resolution) | ✓              | ✓              |
| 36.   | Fundamental Export kVARh (Up to 14 digit resolution) | ✓              | ✓              |

✓ - Available    × - Not available

## 7. Display Parameter

| Sr No | Parameter                                           | 3 Phase 4 Wire | 3 Phase 3 Wire |
|-------|-----------------------------------------------------|----------------|----------------|
| 37.   | kVAh (Up to 14 digit resolution)                    | ✓              | ✓              |
| 38.   | Current Demand                                      | ✓              | ✓              |
| 39.   | kVA Demand                                          | ✓              | ✓              |
| 40.   | kW Import Demand                                    | ✓              | ✓              |
| 41.   | kW Export Demand                                    | ✓              | ✓              |
| 42.   | Max Current Demand                                  | ✓              | ✓              |
| 43.   | Max kVA Demand                                      | ✓              | ✓              |
| 44.   | Max kW Import Demand                                | ✓              | ✓              |
| 45.   | Max kW Export Demand                                | ✓              | ✓              |
| 46.   | Run Hour                                            | ✓              | ✓              |
| 47.   | On Hour                                             | ✓              | ✓              |
| 48.   | Number of Interruption                              | ✓              | ✓              |
| 49.   | Phase Reversal Indication                           | ✓              | ×              |
| 50.   | Phasor Diagram                                      | ✓              | ×              |
| 51.   | Voltage Waveform                                    | ✓              | ✓              |
| 52.   | Current Waveform                                    | ✓              | ✓              |
| 53.   | % THD Voltage L1-N                                  | ✓              | ×              |
| 54.   | % THD Voltage L2-N                                  | ✓              | ×              |
| 55.   | % THD Voltage L3-N                                  | ✓              | ×              |
| 56.   | % THD Voltage L1-L2                                 | ×              | ✓              |
| 57.   | % THD Voltage L2-L3                                 | ×              | ✓              |
| 58.   | % THD Voltage L3-L1                                 | ×              | ✓              |
| 59.   | % THD Current L1                                    | ✓              | ✓              |
| 60.   | % THD Current L2                                    | ✓              | ×              |
| 61.   | % THD Current L3                                    | ✓              | ✓              |
| 62.   | % THD Voltage Mean                                  | ✓              | ✓              |
| 63.   | % THD Current Mean                                  | ✓              | ✓              |
| 64.   | RMS voltage of Harmonics                            | ✓              | ✓              |
| 65.   | RMS Current of Harmonics                            | ✓              | ✓              |
| 66.   | Fundamental Active Power per phase                  | ✓              | ×              |
| 67.   | Fundamental Reactive Power per phase                | ✓              | ×              |
| 68.   | Fundamental Apparent Power per phase                | ✓              | ×              |
| 69.   | Fundamental Power Factor per phase                  | ✓              | ×              |
| 70.   | Individual Harmonic Active Power per phase          | ✓              | ×              |
| 71.   | Individual Harmonic Reactive Power per phase        | ✓              | ×              |
| 72.   | Individual Harmonic Apparent Power per phase        | ✓              | ×              |
| 73.   | Distortion Factor of all harmonics on phase voltage | ✓              | ✓              |
| 74.   | Distortion Factor of all harmonics on phase Current | ✓              | ✓              |
| 75.   | Power Factor of Individual Harmonic per phase       | ✓              | ×              |
| 76.   | Fundamental voltage RMS per phase                   | ✓              | ✓              |
| 77.   | Fundamental current RMS per phase                   | ✓              | ✓              |
| 78.   | Swell indication                                    | ✓              | ✓              |
| 79.   | Over current indication                             | ✓              | ✓              |
| 80.   | Sag indication                                      | ✓              | ✓              |

✓ - Available    × - Not available

## 8. Ordering Information

| Product Code    | AP70 -                 | X | XX | XX | X | X | X | X | 0000 |
|-----------------|------------------------|---|----|----|---|---|---|---|------|
| Network         | 1 Ph                   | 1 |    |    |   |   |   |   |      |
|                 | 3PH 3W/4W              | 3 |    |    |   |   |   |   |      |
| Input Voltage 1 | 00 -500 V              |   | 8F | 75 |   |   |   |   |      |
| Input Current   | 1/5 A                  |   |    |    |   |   |   |   |      |
| Power Supply    | 20 -40A/ 20            |   |    |    | Q |   |   |   |      |
|                 | 60 -300 U              |   |    |    | H |   |   |   |      |
| RS 485          | With RS 485            |   |    |    |   | R |   |   |      |
|                 | Without RS 485         |   |    |    |   | Z |   |   |      |
| Pulse Output    | 1 Pulse output         |   |    |    |   |   | S |   |      |
|                 | 2 Pulse output         |   |    |    |   |   | D |   |      |
|                 | Pulse O/P not used     |   |    |    |   |   | Z |   |      |
| Impulse         | I: With Impulse LED    |   |    |    |   |   |   | I |      |
|                 | Z: Without Impulse LED |   |    |    |   |   |   | Z |      |

## Contact



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